IN THE CLAIMS:

Please ADD new claim 15 in accordance with the following:

1. (PREVIOUSLY PRESENTED) A circular rotor for a synchronous motor, comprising:

a plurality of poles, where at least a part of an outer periphery of one pole of the rotor has a shape of a hyperbolic cosine curve in a cross section perpendicular to a central axis of the rotor.

2. (PREVIOUSLY PRESENTED) A circular rotor for a synchronous motor according to claim 1, wherein more than half of the outer periphery of the one pole of the rotor is defined by the hyperbolic cosine curve.

3. (PREVIOUSLY PRESENTED) A circular rotor for a synchronous motor according to claim 1, wherein all of the outer periphery of the one pole of the rotor is defined by the hyperbolic cosine curve.

4. (PREVIOUSLY PRESENTED) A circular rotor for a synchronous motor according to claim 1, wherein a central part of the outer periphery of the one pole is defined the hyperbolic cosine curve.

5. (PREVIOUSLY PRESENTED) A circular rotor for a synchronous motor, comprising:

a plurality of poles, where at least a part of an outer periphery of one pole of the rotor, in a cross section perpendicular to a central axis of the rotor, is defined by a curve of a hyperbolic function , wherein the hyperbolic function is expressed as $R = A\text{-}B * (e^{c\theta} + e^{-c\theta})$, where R

represents a distance from a central axis of the rotor or a fixed point, θ represents a rotational angle from a straight line passing through a center of the outer periphery of one pole and perpendicular to the central axis of the rotor, A, B and C are constants and e is a base of natural logarithm or a constant.

6. (PREVIOUSLY PRESENTED) A circular rotor for a synchronous motor, comprising:

a plurality of poles, where at least a part of an outer periphery of one pole of the rotor, in a cross section perpendicular to a central axis of the rotor, is defined by a curve of a hyperbolic function , wherein the hyperbolic function is expressed as $X = A\text{-}B * (e^{cY} + e^{-cY})$ on a X-Y coordinate system with a X axis passing through a center of the outer periphery of one pole of the rotor and perpendicular to a central axis of the rotor, a Y axis perpendicular to the X axis and the central axis of the rotor and an origin as a crossing point of the X axis and the Y axis, where A, B and C are constants and e is a base of natural logarithm or a constant.

7. (PREVIOUSLY PRESENTED) A rotor for a synchronous motor according to claim 1, wherein the outer periphery of one pole of the rotor includes a region defined based on the hyperbolic cosine curve and a second region defined based on segments of straight lines or curves.

8. (PREVIOUSLY PRESENTED) A synchronous motor, comprising:

a circular rotor with a plurality of magnetic poles perpendicular to a central axis of the rotor, wherein at least one magnetic pole of the plurality of magnetic poles has an outer edge having a shape of a hyperbolic cosine curve.

9. (PREVIOUSLY PRESENTED) A synchronous motor according to claim 8, wherein more than half of the outer periphery of the one pole of the rotor is defined by the hyperbolic cosine curve .

10. (PREVIOUSLY PRESENTED) A synchronous motor according to claim 8, wherein all of the outer periphery of the one pole of the rotor is defined by the hyperbolic cosine curve .

11. (PREVIOUSLY PRESENTED) A synchronous motor according to claim 8, wherein a central part of the outer periphery of the one pole is defined the hyperbolic cosine curve.

12. (PREVIOUSLY PRESENTED) A synchronous motor, comprising:

a circular rotor with a plurality of magnetic poles perpendicular to a central axis of the rotor, wherein at least one magnetic pole of the plurality of magnetic poles has an outer edge that is defined by a curve of a hyperbolic function , wherein the hyperbolic function is expressed as $R = A\text{-}B * (e^{c\theta} + e^{-c\theta})$, where R represents a distance from a central axis of the rotor or a fixed point, θ represents a rotational angle from a straight line passing through a center of the outer periphery of one pole and perpendicular to the central axis of the rotor, A, B and C are constants and e is a base of natural logarithm or a constant.

13. (PREVIOUSLY PRESENTED) A synchronous motor, comprising:

a circular rotor with a plurality of magnetic poles perpendicular to a central axis of the rotor, wherein at least one magnetic pole of the plurality of magnetic poles has an outer edge that is defined by a curve of a hyperbolic function , wherein the hyperbolic curve is expressed as

$X = A\text{-}B * (e^{cY} + e^{-cY})$ on a X-Y coordinate system with a X axis passing through a center of the outer periphery of one pole of the rotor and perpendicular to a central axis of the rotor, a Y axis perpendicular to the X axis and the central axis of the rotor and an origin as a crossing point of the X axis and the Y axis, where A, B and C are constants and e is a base of natural logarithm or a constant.

14. (PREVIOUSLY PRESENTED) A synchronous motor according to claim 8, wherein the outer periphery of one pole of the rotor includes a region defined based on the hyperbolic cosine curve and a second region is defined based on segments of straight lines or curves.

15. (NEW) A circular rotor for a synchronous motor according to claim 1, wherein the hyperbolic cosine curve is a function expressing real numbers.